PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	27 NOV 2006
Applicant's or agent's file reference	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US05/00505	07 January 2005 (07.01.2005)	09 January 2004 (09.01.2004)

International Patent Classification (IPC) or both national classification and IPC

IPC: **B22C 9/00(2007.01);C25D 13/02(2007.01)**
USPC: 164/516,517,518,519,361;204/484,490,491

Applicant

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1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(*b*) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	29 October 2006 (29.10.2006)	Ing-Hour Lin Telephone No. (703) 308-0651

Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US05/00505

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-78	YES
	Claims NONE	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-78	NO
Industrial applicability (IA)	Claims 1-78	YES
	Claims NONE	NO

2. Citations and explanations:

Claims 1-22, 27-48 and 53-74 lack an inventive step under PCT Article 33(3) as being obvious over Szabo in view of Ue et al. Szabo (col. 2, lines 37+) teaches the claimed method of forming a shell on a template or conductive coated wax pattern and the claimed casting mold using the claimed method, comprising the use of electrophoretic deposition of colloidal charged refractory particles under the controlled direct current and voltage for forming shell on the conductive coated wax pattern in order to form a casting mold for casting molten metal including preheating the mold before pouring the molten metal into the mold, the suspension or electrolytic solution can be aqueous or non-aqueous and colloidal refractory particles includes silica and alumina. Szabo fails to teach the use of effective salt of monovalent cation. However, Ue et al (col. 2, lines 30+) teach the use of effective salt of monovalent cation such as sodium ion of 5wt% in the electrolyte for the purpose of imparting charge to the colloidal particles such as aluminosilicate having controlled fine size between 3 to 150 nm suspended in the non-aqueous slurry including solution of methanol and ethanol for the purpose of improving dielectric breakdown voltage (spark voltage) greater than 80V at applied current of 5 mA. It would have been obvious to one having ordinary skill in the art to provide Szabo the use of electrolyte solution including effective salt and controlled fine size of colloidal particles as taught by Ue et al in order to effectively form foundry molds by the electrophoretic deposition.

Claims 23-26, 49-52 and 75-78 lack an inventive step under PCT Article 33(3) as being obvious over the prior art as applied in the immediately preceding paragraph and further in view of Gal-Or et al. Szabo in view of Ue et al fails to teach the use of low porosity for the multilayer deposition for the shell. However, Gal-Or et al (col. 3, lines 26+) teach the use of low porosity for the multilayer deposition for the shell for the purpose of producing green shell having porosity less than 30% and less than 2% for the fired body; and depositing each microlayer in a different suspension. It would have been obvious to one having ordinary skill I the art to provide Szabo in view of Ue et al the use of low porosity for the multilayer deposition for the shell as taught by Gal-Or et al in order to effectively form foundry molds by the electrophoretic.

Claims 1-78 meet the criteria set out in PCT Article 33(4), and thus having industrial applicability because the subject matter claimed can be made or used in industry.